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Why some WOOD SURFACES HOLD PAINT *longer than others*

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WHY SOME WOOD SURFACES HOLD PAINT LONGER THAN OTHERS

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The impression has long prevailed that outside house paints must be mixed according to the kind of wood to be coated. Experimental study with the normal exterior exposure of painted softwoods—that is, wood cut from evergreen or coniferous trees—proves these traditional recommendations to be unnecessarily complicated. The painter need not change the composition of his priming-coat mixture for different softwoods; on the contrary, he may as well adopt a single formula for mixing the priming coat. To be sure, the paint when so applied will not last equally long on all woods, but the differences are not reduced materially by any practicable adjustment of the proportions of paint, oil, and thinner or of the kind of thinner in the priming coat.

Where abnormal conditions arise under which moisture in large amounts gains access to the backs of painted boards, paint coatings may fail by blistering and peeling or may be discolored with water-soluble materials leached from the wood. Paint trouble resulting from these abnormal conditions is not confined to any species of wood. Such trouble can be prevented only by discovering the source of the unusual amounts of moisture and removing it.

Painting Characteristics Depend on Wood Texture and Density

The painting characteristics of a board depend primarily upon the amount and distribution of summer wood in it. Summer wood is the dense, horny, dark-colored portion of the annual-growth ring, formed in the tree late in the growing season. It is made up of wood cells with very thick walls and small cavities and is in this sense much less porous than the spring wood, which is composed of cells with thin walls and correspondingly large cavities. Although liquids move more readily through the dense summer wood and paint oils are found to penetrate more deeply there, paint coatings do not seem to secure so firm an anchorage on summer wood as they do on spring wood; as a result, coatings exposed to normal conditions of weathering fail by flaking from the summer wood, leaving it bare while the spring wood remains apparently well covered. All native softwoods contain both summer wood and spring wood, but the proportions vary in different woods and in different boards of the same wood. There is, in fact, a greater variation in painting characteristics between the spring wood and summer wood in a single board than there is between average boards of different woods.

The density, or weight per unit volume, of a softwood board measures roughly its ability to hold paint coatings because boards are heavy or light according as they contain much or little summer wood. However, if a board has many annual-growth rings per inch it may have the summer wood confined to narrow bands and yet be moderately heavy. (Fig. 1.) Such boards hold paint far better than boards of equal weight cut from more rapidly grown trees, in which the summer wood is present necessarily in wide bands.

[1] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

Selecting Wood for Painting Characteristics

The following methods help in selecting the kind of wood that holds paint coatings most satisfactorily.

By Species

Since woods are marketed by species, this method is easier to follow but less effective and less economical than the other methods. In the Forest Products Laboratory's tests, the cedars, cypress, and redwood held paint best, and northern white pine, western white pine, and sugar pine did almost as well. With southern yellow pine and Douglas fir, which are abundantly available woods whose high strength makes them especially suitable for building construction, together with western larch, serious flaking of the coatings from the summer wood occurred sooner than with the other species tested. Western yellow pine, white fir, the hemlocks, and the spruces fell between the white pine group and the southern yellow pine-Douglas fir group.

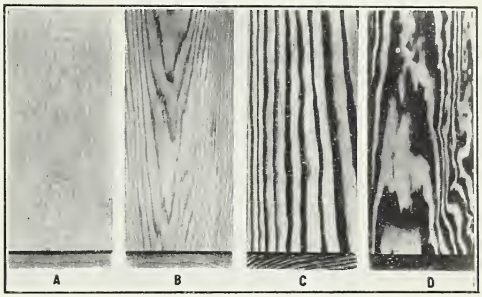

FIGURE 1.—Painting characteristics depend on wood texture and density. Boards A and B hold paint well, boards C and D poorly. Beneath each board is placed a small piece cut from the end and turned so that the annual growth rings can be seen on the end-grained surface. Board A had 36 annual rings per inch of radius of the log and at 6 per cent moisture content weighed 25 pounds per cubic foot; B had 27 rings and weighed 30 pounds; C had 6 rings and weighed 30 pounds; D had 15 rings and weighed 46 pounds

By Density and Texture

The wood of many species varies greatly in density and texture and therefore in painting characteristics. Thus, for example, when light, narrow-ringed boards are found in southern yellow pine or Douglas fir, they hold paint about as well as the wide-ringed boards of cypress, and light, narrow-ringed boards of western yellow pine behave like the white pines. Density and texture therefore afford the most satisfactory basis for selecting the best wood to paint, wherever it proves practicable to apply them.

By Grade

Knots and pitch play a large part in the grading of lumber. Since they give trouble in painting, the select grades of lumber, which permit few defects, are more satisfactory to paint than the common grades. Knots in the pines, both white and yellow pines, seem to be more objectionable from the point of view of painting than sound knots in woods like the cedars, the hemlocks, white fir, and larch.

By Kind of Grain

Edge-grained boards hold paint far better than flat-grained boards. (Fig. 2.) This is because the bands of summer wood in the edge-grained boards are cut in such a manner that they are as narrow as possible. Among flat-grained boards, those surfaced and painted on the bark side (the side nearer the bark of the log) are more satisfactory to paint than those turned pith side out because there is less danger of the "grain shelling out." (Fig. 3.) Even some woods that hold paint best may give difficulty with grain shelling under these circumstances. Like method 2, selection by the kind

of grain is difficult to apply to the purchase of many kinds of lumber because only lumber cut from very large trees can be economically segregated according to such classifications.

Southern Exposure Is Hardest on Paint

Although the buyer of lumber in small quantities can seldom confine his purchases to the kinds of material that give best paint service, nevertheless he can sometimes distribute his lumber to best advantage among the various parts of his building. Some parts are more conspicuous or more severely exposed to the weather than others and the best lumber may be placed there. Paint wears out most rapidly where it is most directly exposed to sunlight, and the time for repainting the entire building is determined by the part on which the paint fails first. As a rule this is the south side, though local conditions, such as the shading by trees and neighboring buildings, may alter conditions greatly.

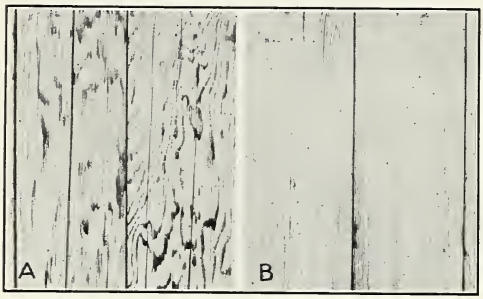

FIGURE 2.—Edge grain holds paint better than flat grain: A, Flat-grained panel showing failure of paint over summer-wood bands; B, edge-grained panel in a better condition than the flat-grained panel, but disintegration of paint over summer-wood bands is shown. This panel is of the same species of wood, paint, and age of paint coating as A

When to Repaint

Repainting should not be put off until the old coating has flaked badly and much bare wood is exposed. The old coating serves as the foundation for the new one, and if it is badly chipped and broken, customary methods of repainting do not secure a first-class appearance and a durable repaint job. Very often coatings fail to give adequate protection against weathering long before they flake noticeably. This is especially true of flat-grained boards of some species that hold paint well because of their low content of summer wood. Conspicuous wood checks or cracks show clearly that the wood is no longer receiving sufficient protection even though the coating is apparently intact. Repainting neither heals nor entirely conceals weathering damage that has become conspicuous, but if the wood is repainted promptly when minute wood checks begin to appear, it can be protected from weathering indefinitely.

FIGURE 3.—Flat-grained boards surfaced and painted on the side nearer the bark of the log are more satisfactory to paint than those turned with the pith side out: A, Flat-grained board painted on the bark side showing a satisfactory coating; B, flat-grained board painted on the pith side showing paint failure as a result of the grain shelling out. This panel is of the same species of wood, paint, and age of paint coating as A

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